State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

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To: STEVE WYATT, P.E.
Senior Transportation Engineer
Design Branch II

Date: January 7, 2010

File: EA 05-0Q620K

From: ROGER D. BARNES, R.C.E., T.E.
Transportation Engineer
District 5 Traffic Operations Branch

Subject: Supplemental Information – Los Berros Road to Traffic Way Median Barrier Project

This Technical Memorandum provides additional documentation to support the recommendations and conclusions of the August 5, 2009 Traffic Study prepared for the above referenced project.

1. **Correspondence - December 17, 2009 letter from San Luis Obispo County Fourth District Supervisor Khatchik H. "Katcho" Achadjian to Caltrans District 5 Director Rich Krumholz.**

   In the Correspondence received by the Department on December 17, 2009, Supervisor Achadjian expresses his concern regarding median closures at El Campo Road and Laetitia Winery. The letter may be found in Attachment A and is summarized below.

   - In this letter, Supervisor Achadjian makes the following statement regarding the above referenced project:

     "The closure of the Laetitia gap would cut off southbound Highway 101 access to a popular tourist attraction and require traffic to continue another 1.6 miles beyond the winery to the Los Berros Road exit. This traffic would then have to cross the freeway and double back to access the winery. The visitors leaving Laetitia and wishing to go southbound would have to drive northbound either to El Campo, or if El Campo is closed, all the way to Arroyo Grande to turn around and head back southbound. The closure of the El Campo gap will exacerbate surface street congestion which the City of Arroyo Grande is experiencing and add over 3 miles to the drive for people in this area."

     "The Laetitia and El Campo gaps are improved with acceleration and deceleration lanes making them a safer place for drivers to turn and it makes sense to leave them in place. As this project moves forward, I urge you to consider leaving the gaps at El Campo and Laetitia Winery."

2. Correspondence – San Luis Obispo Council of Governments (SLOCOG) Board Meetings

San Luis Obispo County Supervisor Katcho Achadjian (Fourth District) has expressed concern for the safety of the motoring public at the intersection of US 101 & El Campo Road during several SLOCOG Board meetings held in 2007 & 2008. The SLOCOG Board meeting minutes may be found in Attachment B and are summarized below.

- Page D-1-3 of the SLOCOG June 4, 2008 Board meeting minutes provide the following account of a discussion that took place regarding the intersection of US 101 and El Campo Road:

  Board Member Katcho Achadjian spoke about the safety issue at US 101/El Campo Road in Arroyo Grande, mentioning that an accident recently occurred there. He noted that he and Board member Tony Ferrara have been communicating with El Campo residents and that some residents suggested closing El Campo Road. He asked if some improvements can be done to eliminate the danger of that intersection – maybe close the northbound access to El Campo Road or construct southbound 101 off/on access ramps. He recommended Caltrans look into this issue because one more accident is far too many. He suggested that Caltrans access the US/101 El Campo situation and communicate with the City of Arroyo Grande and his office. **Mr. Krumholz** assured Board Member Achadjian his commitment on this issue, noting that Caltrans will meet with County staff and the City of Arroyo Grande staff to discuss possible solutions, including closing the northbound access.

- Pages C-1-18 of the SLOCOG February 7, 2007 Board meeting minutes provide the following account of a discussion that took place regarding the intersection of US 101 and El Campo Road:

  Board Member Achadjian asked Caltrans if there is any future plan to increase the length of acceleration and deceleration lanes on US 101 south of El Campo Road and perhaps install a flashing light on the southbound lanes at that portion of freeway. **Mr. Krumholz** thanked Board Member Achadjian for bringing this issue to his attention, indicating that staff would confer with traffic engineers and will get the latest accident history for that area and report back to the Board. **Board Member Achadjian** requested Mr. Krumholz to directly e-mail him the response, noting there is no need to bring their findings to the Board. **Mr. Krumholz** concurred. **Past President Ferrara** requested to have a copy of the findings emailed to him. **Mr. Krumholz** agreed.

3. Consistency with City of Arroyo Grande Traffic Studies

The Median Barrier Project will result in the diversion of 300 ADT (41 AM peak hour, 20 PM peak hour) to West Branch Street and the surrounding intersections within the City of Arroyo Grande. The conclusion that the Median Barrier Project will not have a significant impact on the City of Arroyo Grande local street network is supported by the August 27, 2009 Final IN-N-OUT Burger Traffic Impact Analysis, as well as, the City of Arroyo Grande Police Station Draft Mitigated Negative Declaration. The supporting documentation may be found in Attachments C & D and are summarized below:

- IN-N-OUT Burger: On August 27, 2009 - George W. Nickelson, P.E. prepared a Traffic Impact Analysis for a proposed IN-N-OUT Burger within the Five Cities Shopping Center in the City of Arroyo Grande. Mr. Nickelson, P.E., concluded that an IN-N-OUT Burger generating 182 PM peak hour trips (69 Net New PM peak hour trips) would not have any measurable effects on West Branch Street and the surrounding intersections. Last paragraph of page 8 States the Following:

  5. CONCLUSIONS AND RECOMMENDATIONS

  "With the IN-N-OUT restaurant, operations would remain LOS "D" or better at the study intersections. The IN-N-OUT project traffic increases (compared with the existing peak hour volumes) would not be measurable within typical daily fluctuations in traffic flows."

- City of Arroyo Grande: On December 23, 2009 - A Draft Mitigated Negative Declaration for a proposed Police Station on Rodeo Drive was circulated by the City of Arroyo Grande. The **TRANSPORTATION/TRAFFIC** section of the Mitigated Negative Declaration concluded that the addition of 292 daily trips would not have any measurable effects on West Branch Street and the surrounding intersections. Page 17 of the Draft Mitigated Negative Declaration states the following:

  "Traffic related to police station uses is generally less than comparable sized office developments. The police department utilizes two shifts during each 24 hour period (6 am – 6 pm and 6 pm – 6 am). The day shift utilizes approximately 20 employees while 6 employees are assigned to the night shift. SANDAG trip generation rates indicate 14 trips per 1000 square feet for single tenant offices which is estimated to generate 292 trips per day. The addition of these trips onto Rodeo Drive, West Branch Street and surrounding intersections would have a less than significant impact."

4. **Summary of Traffic Studies**

Table 1 summaries the net new trips generated by the Median Barrier, IN-N-OUT Burger, and Police Station Projects that will be added to West Branch Street and the surrounding intersections.

Table 1 – Project Generated Trips (Net New)

Study	ADT Volumes	AM Peak Hour	PM Peak Hour	Conclusion
Median Barrier	300	41	20	No Significant Impact
IN-N-OUT Burger	Not Disclosed In Study	Not Disclosed In Study	69	No Measureable Effects
Police Station	292	Not Disclosed In Study	Not Disclosed In Study	No Significant Impact

5. **Average Daily Trip (ADT) Generation Rates**

As depicted in Table 1, the Traffic Study prepared by George W. Nickelson, P.E. for a proposed IN-N-OUT Burger within the City of Arroyo Grande did not disclose the Average Daily Trips (ADT) that would be added to the State Highway System and Local Street Network. However, the IN-N-OUT Burger Traffic Study did provide PM peak hour trip rates acquired from the San Diego Association of Governments (SANDAG), *Brief Guide of Vehicular Traffic Generation rates for the San Diego Region,* April 2002.

District 5 Traffic Operations obtained a copy of the San Diego Association of Governments (SANDAG), *Brief Guide of Vehicular Traffic Generation rates for the San Diego Region,* April 2002. The SANDAG Trip Rates may be found in Attachment E and provides the following information:

- The IN-N-OUT Burger will add 1,572 new Average Daily Trips (ADT) to the State Highway System and Local Street Network. By comparison, the median closure of US 101 at El Campo Road would result in the diversion of only 971 Average Daily Trips (ADT) to the State Highway System and Local Street Network as a result of the Median Barrier Project.

- The IN-N-OUT Burger will generate 602 (61.9%) additional Average Daily Trips (ADT) to the State Highway System and Local Street Network than would divert to alternate locations due to the median closure of US 101 at El Campo Road as a result of the Median Barrier Project.

Table 2 summaries the Average Daily Trips (ADT) that will be added to the State Highway System and Local Street Network as a result of the IN-N-OUT Burger and Median Barrier Projects.

Table 2 - Average Daily Trip Generation

Condition	Trip Rates Average Daily Trips (ADT)	Total Trips Average Daily Trips (ADT)
Proposed 3,265 sq.ft. IN-N-OUT Burger	650/1000 sq.ft.	2122
Existing 5,500 sq.ft. Sizzler Restaurant	100/1000 sq.ft.	550
IN-N-OUT Burger - New Trips		1572
El Campo Road - Diverted Trips		971

Source: San Diego Association of Governments (SANDAG), *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region,* April 2002.

In Conclusion, this Technical Memorandum provides additional documentation to support the recommendations and conclusions of the August 5, 2009 Traffic Study prepared for the above referenced project and confirms that the median closure of all at-grade intersection and crossover locations within the project limits will not result in a degradation to the State Highway System and Local Street Network.

Respectfully,

ORIGINAL SIGNATURE ON
FILE

Roger D. Barnes, R.C.E., T.E.
Transportation Engineer
District 5 Traffic Operations Branch

Enclosure – Attachments

c: File, P. McClintic

Attachment A

Local Agency Letters

- 12/17/2009 – Supervisor Achadjian

BOARD OF SUPERVISORS

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KHATCHIK H. "KATCHO" ACHADJIAN
SUPERVISOR DISTRICT FOUR

December 17, 2009

Rich Krumholz, Director
Cal Trans District 5
50 Higuera St.
San Luis Obispo, CA 93401

Dear Director Krumholz:

I am writing to you regarding the proposed Los Berros Median Barrier project to eliminate cross-over collisions on Highway 101 between Traffic Way and Los Berros. This item will be on the SLO COG agenda on January 6, 2010 and unfortunately I will not be able to attend that meeting. Although I am in favor of eliminating and/or reducing collisions on this section of the highway, I would like to share my concerns regarding closing the barrier gaps at El Campo and at the Laetitia Winery.

The closure of the Laetitia gap would cut off southbound Highway 101 access to a popular tourist attraction and require traffic to continue another 1.6 miles beyond the winery to the Los Berros Road exit. This traffic would then have to cross the freeway and double back to access the winery. The visitors leaving Laetitia and wishing to go southbound would have to drive northbound either to El Campo, or if El Campo is closed, all the way to Arroyo Grande to turn around and head back southbound. The closure of the El Campo gap will exacerbate surface street congestion which the City of Arroyo Grande is experiencing and add over 3 miles to the drive for people in this area.

The Laetitia and El Campo gaps are improved with acceleration and deceleration lanes making them a safer place for drivers to turn and it makes sense to leave them in place. As this project moves forward, I urge you to consider leaving the gaps at El Campo and Laetitia Winery.

Sincerely,

KHATCHIK H. "KATCHO" ACHADJIAN
Supervisor District Four

c: Ron DeCarli, SLO COG
Tony Ferrara, Mayor, City of Arroyo Grande

Attachment B

SLOCOG Minutes

- June 4, 2008 – SLOCOG
- February 7, 2007 – SLOCOG

- *Announcement of the passing of two former SLOCOG executive directors:*
  - Ned Rogaway – a former County Planning Director who helped established SLOCOG in 1968 and ran the agency until 1980 when he retired.
  - Paul Crawford – also a former County Planning Director, was the SLOCOG Executive Director until 1984.

President Shoals thanked Mr. De Carli for his report and welcomed Ms. Marshall to SLOCOG. He also thanked Ms. Lisa Quinn (in absentia) and Ms. Jaime Hill for their efforts and service for Rideshare. He then asked for any comments from the Board and the public; there were none.

CALTRANS DISTRICT 5 DIRECTOR'S REPORT: Mr. Rich Krumholz, Caltrans District 5 Director, brought to attention that the agenda packet includes an update on quite a number of highway projects, noting that this is a busy construction year and season. He asked citizens to continue to be vigilant as they pass through the construction sites. **Mr. Krumholz** continued his report:

- A number of cyclists will be passing through the county today as part of the "AIDS/LIFECYCLE" ride. Motorists are encouraged to continue to care and share the road with these cyclists.
- As part of Caltrans' continued emphasis on gaining transportation efficiencies through technology and information sharing, additional cameras will be installed in the next several months on the US 101 corridor (one camera at 101/Broad Street, one at 101/between California and Grand, and one at 101/41 once construction is done).
- In their continued effort to go green, Caltrans District 5 will begin an open graded warm asphalt concrete project on Highway 46 (out of Shandon area). Some of the advantages of using warm mix asphalt concrete are -- it can be hauled longer distances; it can be manufactured and installed at lower temperatures (hence, less energy use and better for the environment). The project will start this month (June) and expected to be completed in July.
- Mr. Krumholz and Mr. De Carli both attended the California Transportation Commission (CTC) meeting last week. **Mr. Krumholz** was very pleased to announce that the CTC has approved $16 million in Caltrans Interregional Transportation Improvement Program (ITIP) money for Highway 46 widening. This will help fund the design and Right of Way (ROW) support for the 3rd segment (widening of Whitley 2).
- The Highway 46 workshop (focusing on the 5-mile segment of Highway 46 between 101 and Jardin Road) that Caltrans District 5 conducted in Paso Robles was a success. The workshop received good community support and participation.
- Mr. Krumholz has signed the Environmental Impact Report (EIR) on the 101/46 W interchange project. The document is now out for public review. A public hearing is scheduled for June 25, 2008, and deadline for public comments is July 18, 2008.
- Caltrans staff continued to watch the 08/09 State budget. Mr. Krumholz noted that it is encouraging to see that the Governor's May Revise includes the funding for Proposition 42 ($1.4B for FY 08/09).

Board Member Katcho Achadjian spoke about the safety issue at US 101/ El Campo Road in Arroyo Grande, mentioning that an accident recently occurred there. He noted that he and Board Member Tony Ferrara have been communicating with El Campo residents and that some residents suggested closing El Campo Road. He asked if some improvements can be done to eliminate the danger of that intersection – maybe close the northbound access to El Campo Road or construct a southbound US 101 off/on access ramps. He recommended Caltrans look into this issue because one more accident is far too many. He suggested that Caltrans assess the US/101 El Campo situation and communicate with the City of Arroyo Grande and his office. **Mr. Krumholz** assured Board Member Achadjian his commitment on this issue, noting that Caltrans will meet with County staff and the City of Arroyo Grande staff to discuss possible solutions, including closing the northbound access. The goal is to convert that particular section to a freeway. Caltrans will continue to monitor that area.

E-2 Year-to-date Financial Report and Budget Adjustment (With 50% of the fiscal year elapsed, SLOCOG has expended 52.71% of its budget and received 57.46% of anticipated revenue) (Receive and File Financial Statements; Authorize a budget adjustment as reflected in the staff report, and make minor adjustments to expenditures and revenues [see staff report]).

E-3 Annual 2008 Transportation Appropriations Bill – Candidate Projects (Ratify candidate project list for 2008 Transportation Appropriations funding consideration and forward legislative representatives).

E-4 Memorandum of Understanding (MOU) between SLOCOG and Kern Council of Governments regarding Highway 46 corridor between Highway 101 and Interstate 5 (Support the establishment of the MOU and instruct the President to sign).

E-5 State Highway Account (SHA) Administration (Provide Executive Director authority to develop and execute funding agreements with the County of San Luis Obispo and the State Department of Parks and Recreation that allows the use of SLOCOG SHA funds, in lieu of federal funds, in escrow proceedings for two projects).

E-6 Correspondence and News Articles (Information).

E-7 Regional Deficiency Analysis and Nexus Study (Approve Scope of Work).

E-8 Call Box Upgrade Project Status Report (Completed) & Memorandum of Understanding (MOU) with Santa Barbara Association of Governments (SBCAG) for Jointly Managing Call Boxes on Highway 66 (Information on Americans with Disability Act [ADA] Upgrade; Authorized the Executive Director to sign MOU with SBCAG).

E-9 Memorandum of Understanding (MOU) between SLOCOG, Santa Barbara County Association of Governments (SBCAG) and Caltrans regarding the Highway 101 corridor between Santa Maria and San Luis Obispo (Support the establishment of the MOU/Charter and instruct the Executive Director to sign the attached document).

E-10 Cooperative Agreement with Caltrans to contribute federal demonstration funding to the State Route 46 East Widening Project (Union Segment) (Direct the President to execute the Cooperative Agreement).

E-11 Cooperative Funding Agreement with the National Railroad Passenger Corporation (AMTRAK) for Amtrak to construct improvements at the Grover Beach Rail Station to conform to the American Disabilities Act in the total amount of $80,0000 (Authorize Executive Director to execute the Cooperative Agreement and integrate any changes recommended by Legal Counsel).

E-12 Proposition 1B Transportation Bonds State and Local Partnership Program (Authorize the President to sign the Letter to advocate broadening the program to include sales tax & development fees).

E-13 Letter from the Strategic Energy Alliance for Change (SEA-Change) requesting SLOCOG co-sponsor a Community Planning Workshop on Regional Energy Planning in late Spring or early Summer and explore the opportunity for coordinating a regional planning effort with County Planning and SLOCOG (Conceptually support; continue to March and report back options for Board consideration).

Past President Ferrara moved to approve the Consent Agenda as presented and <u>as amended</u> per Addendum. Board Member O'Malley seconded, and the motion carried on a roll call vote in the absence of Board Member Ovitt.

<u>F. BOARD MEMBER COMMENTS</u>: President Patterson thanked Board members for their patience and cooperation in dealing with the large agenda and the issues discussed at this meeting, noting that he, Past President Ferrara, and staff worked hard to compress the agenda to get this meeting to end at the expected target time. For future planning, **President Patterson** advised Board members to plan to be at the meeting for at least four hours (until 12:30) because important issues are going to be on the table.

Board Member Achadjian asked Caltrans if there is any future plan to increase the length of acceleration and deceleration lanes on US 101 south at El Campo Road and perhaps install a flashing light on the southbound lanes at that portion of the freeway. **Mr. Krumholz** thanked Board Member Achadjian for bringing this issue to his attention, indicating that staff would confer with traffic engineers and will get the latest accident history for that area and report back to the Board. **Board Member Achadjian** requested Mr. Krumholz to directly email him the response, noting there is no need to bring their findings to the Board. **Mr. Krumholz** concurred. **Past President Ferrara** requested to have a copy of the findings emailed to him. **Mr. Krumholz** agreed.

Attachment C

Traffic Study

- August 27, 2009: IN-N-OUT Burger

George W. Nickelson, P.E.

Traffic Engineering – Transportation Planning

August 27, 2009

Mr. Mark Noack
IN-N-OUT Burger
13502 Hamburger Lane
Baldwin Park, CA 91706

Subject: ***Traffic Impact Analysis for the Proposed IN-N-OUT Restaurant Within the Five Cities Shopping Center in the City of Arroyo Grande***

Dear Mr. Noack:

This report summarizes my review/analysis of the traffic impacts, site access and internal circulation characteristics associated with your proposed Arroyo Grande restaurant. Based on input from City staff, we have conducted detailed traffic impact analyses at the following intersections:(1)

- West Branch Street/Oak Park Boulevard
- West Branch Street/Camino Mercado-Highway 101 Northbound Ramps
- West Branch Street/Brisco Road
- El Camino Real/Brisco Road
- El Camino Real/Highway 101 Southbound Ramps – South Halcyon Road

We have considered driveway access, vehicle circulation and drive-through lane operations. The project's parking demand has also been calculated and compared with the proposed supply.

1. TRAFFIC IMPACT ANALYSIS OF KEY INTERSECTIONS

a. Existing Conditions

Existing weekday PM peak hour (the highest volume hour within the 4:00 – 6:00 PM period) intersection traffic volumes have been obtained from a prior study conducted for the City of Arroyo Grande.(2) Because the existing conditions study is a 2005 document, other volume data was also consulted. A new count at West Branch/Camino Mercado yielded volumes that are very comparable to the 2005 data.(3) In addition, Caltrans historical volume data on Highway 101 (for the years 2005-2008) were reviewed, and no volume increases were identified in this period.(4)

All of the study intersections are controlled by traffic signals, and the intersections' operations therefore reflect the overall conditions experienced by vehicles entering all of the intersection approaches. As shown in Table 1, all of the intersections' conditions are satisfactory with

TABLE 1
BASELINE AND WITH PROJECT
PM PEAK HOUR INTERSECTION OPERATION[1]

Intersection	Existing LOS/ Delay	Existing + Project LOS/Delay	Cumulative Year 2030 LOS/Delay	Cumulative + Project LOS/Delay
West Branch Street/ Oak Park Boulevard	LOS "C"/ 20.9 seconds	LOS "C"/ 21.4 seconds	LOS "D"/ 49.5 seconds	LOS "D"/ 50.4 seconds
West Branch Street/ Camino Mercado-Highway 101 Northbound Ramps	LOS "C"/ 26.4 seconds	LOS "C"/ 26.9 seconds	LOS "E"/ 62.4 seconds[3]	LOS "E"/ 64.6 seconds[3]
West Branch Street/ Brisco Road[2]	LOS "B"/ 16.4 seconds	LOS "B"/ 16.5 seconds	LOS "B"/ 19.6 seconds	LOS "B"/ 19.8 seconds
El Camino Real/ Brisco Road[2]	LOS "D"/ 41.7 seconds	LOS "D"/ 41.9 seconds	LOS "D"/ 51.8 seconds	LOS "D"/ 52.6 seconds
El Camino Real/ Highway 101 Southbound Ramps – South Halcyon Road	LOS "C"/ 24.0 seconds	LOS "C"/ 24.2 seconds	LOS "D"/ 41.0 seconds	LOS "D"/ 41.3 seconds

(1) At these signal controlled intersections, the LOS and delay refer to the overall intersection operation.

(2) The calculations indicate satisfactory operations at these two intersections. However, there are significant queuing problems between El Camino Real and West Branch Street (exacerbated by the existing northbound Highway 101 ramps). The effective operations would be categorized as being in the LOS "E" range.

(3) With recommended mitigation, the cumulative conditions would improve to LOS "D" in the year 2030 and would remain LOS "D" with the IN-N-OUT project.

Level of Service (LOS) "D" or better operations during the PM peak hour (LOS definitions and calculations are attached as appendices).

Although the calculations indicate satisfactory intersection operations, it is recognized that the close spacing of the intersections at the Highway 101/Brisco interchange does result in queuing problems. Based on field observations, queues between West Branch Street, the Highway 101 ramp intersections and El Camino Real can extend back to and beyond the adjacent intersection.

Because the proposed IN-N-OUT restaurant would be most directly served by the northerly shopping center driveway, that driveway has also been counted and analyzed. The driveway operations calculation indicates LOS "B" for out bound driveway traffic and LOS "A" for inbound left turns from West Branch Street. Based on Caltrans design guidelines, the inbound left turn lane needs storage for 5 vehicles or about 100-125 feet.[5] It is noted that during the PM peak hour counts, the inbound left turn queue never exceeded 2-3 vehicles. The existing 155 foot left turn lane would be adequate.

b. Project Traffic Effects

Trip Generation and Distribution

The project trip generation has been calculated on the basis of actual trip counts at existing IN-N-OUT restaurants.[6] These counts indicate that the IN-N-OUT trip rates are 22% higher than the standard fast-food restaurant rates identified by the San Diego Association of Governments (SANDAG).[7] The IN-N-OUT restaurant trip generation calculation has also considered the incidence of pass-by trips. The SANDAG document indicates that 40% of a fast-food restaurant's peak hour trips are pass-by.

It is noted that an existing 5,500 sq.ft. sit-down restaurant is located on the IN-N-OUT site. That restaurant, whose trips are included in the existing traffic volume data, will be removed. Based on the lowest available SANDAG trip rates for a restaurant, the prior restaurant's PM peak hour trips were calculated.

As calculated in Table 2, the proposed IN-N-OUT project would result in a net increase of 45 trips during the PM peak commute hour.

Consideration has also been given to IN-N-OUT trip generation on a Saturday.[8] Based on IN-N-OUT customer volume records, the overall Saturday customer activity is greater than the overall activity on a weekday. However, the peak hour on a Saturday is very comparable to the peak hour on a weekday. Thus, the Saturday impacts of the IN-N-OUT trips would be comparable to the weekday peak hour analysis contained in this study.

Based on a review of existing traffic flow patterns, the area's population distribution and the availability of access routes, the net new project trips' distribution is estimated as follows:

- 20% to/from Highway 101 north;
- 10% to/from Highway 101 south;
- 20% to/from Oak Park Boulevard west of Highway 101;
- 15% to/from Oak Park Boulevard east of Highway 101;
- 20% to/from SR 227 via East Branch Street;
- 10% to/from South Halcyon Road; and
- 5% to/from Rancho Parkway.

The project's "pass-by" trips would reflect vehicles on/off of West Branch Street. The net new trips at intersections are outlined in Figure 1.

Project Effects on Study Intersections

As shown in Table 1, the IN-N-OUT restaurant would add slightly to the PM peak hour delays at the study intersections. Intersection delays would generally increase by less than second. The various intersections' operation would remain LOS "D" or better.

As noted in the discussion of existing conditions, the close spacing of the intersections at the Highway 101/Brisco Road interchange does result in queuing problems. Although the project trips would add to the volumes, queues would not be significantly affected.

The project effects at the north driveway on West Branch Street have also been assessed. With the total project trips (net new trips and pass-by trips) added to the driveway volumes, the operation for outbound traffic would degrade slightly to LOS "C" – delays for outbound vehicles would increase by about 10 seconds. Consideration has been given to the potential benefits of restriping West Branch Street to provide a two-way-left-turn-lane (TWLTL) at the project driveway. With this change, the outbound operation would be returned to LOS "B" with delays comparable to the existing conditions.

2. CUMULATIVE TRAFFIC CONDITIONS

The cumulative year 2030 traffic projections have been identified in the prior study conducted as a part of the Highway 101/Brisco interchange project.[9] These projections include long term traffic growth and a number of improvements/modifications relative to the interchange.

Specific interchange improvements would include the following:

- Elimination of the existing northbound Highway 101 ramps at Brisco Road;
- Elimination of the existing northbound Highway 101 on-ramp from Grand Avenue (SR 227); and
- Construction of new northbound Highway 101 on/off ramps connecting with the West Branch Street/Old Ranch Road intersection.

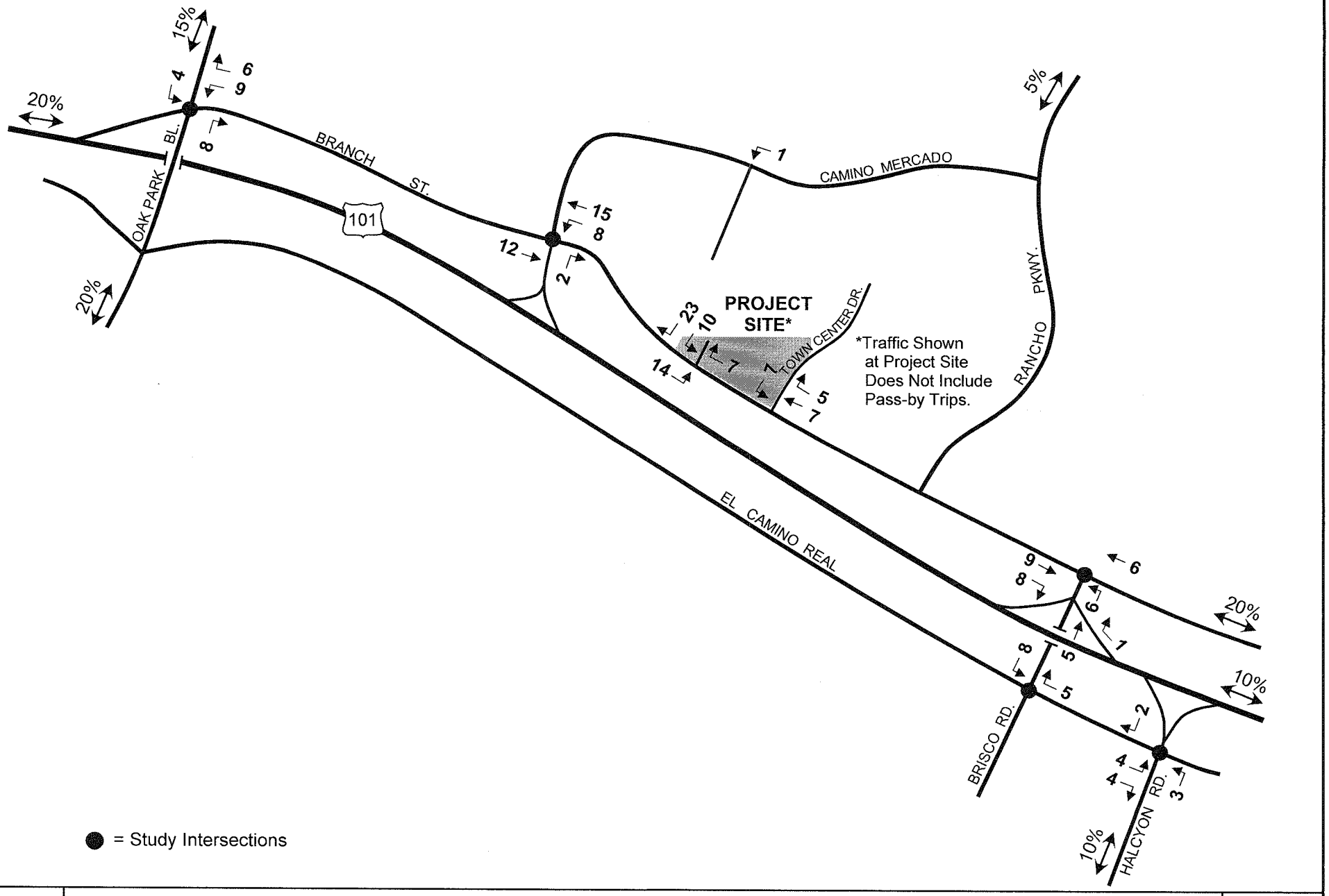
TABLE 2
CALCULATION OF
PM PEAK HOUR PROJECT TRIPS

Condition	Trip Rates	Total Trips	New Trip/ Pass-By Ratios[3]	Net New Trips
Proposed 3,265 sq.ft. IN-N-OUT Restaurant	55.7/1,000[1]	182 trips	60%/40%	109 PM trips 55 in/54 out
Existing 5,500 sq.ft. Restaurant	8.0/1,000[2]	44 trips	90%/10%	40 PM trips 28 in/12 out
Net Traffic Increase		**138 PM trips**		**69 PM trips** **27 in/42 out**

(1) George W. Nickelson, P.E., traffic counts, parking surveys and drive-through service queue surveys conducted at the IN-N-OUT restaurants in Atascadero and Santa Maria, July 23-24, 2009. Traffic counts, parking surveys and drive-through surveys at the Mt. View and Sunnyvale IN-N-OUT restaurants, May 6-7, 2009. Traffic counts, parking surveys and drive-through surveys at the Livermore, Pleasanton and Pittsburg IN-N-OUT restaurants, January-February 2005.

(2) San Diego Association of Governments (SANDAG), *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002.

(3) SANDAG, ibid.



PM Peak Hour Project Trip Distribution Percentages and Net New Project Trips

North

George W. Nickelson, P.E.

figure 1

As shown on Table 1, even with traffic growth, the interchange improvements/modifications would allow intersection operation to generally remain acceptable (LOS "D" or better). However, operations at the West Branch Street/Camino Mercado-Highway 101 Northbound Ramps intersection would degrade to LOS "E". As recommended in the interchange traffic study, widening the northbound approach of West Branch to accommodate two left turn lanes would improve the intersection operation to LOS "D". With the IN-N-OUT trips, the mitigated condition at this intersection would remain at LOS "D".

3. SITE ACCESS AND INTERNAL CIRCULATION

a. Driveway Access

Access for the IN-N-OUT restaurant would be unchanged from the current site access. There would be no new driveways on West Branch Street. Instead, access would continue to be via the main shopping center access at West Branch Street/Town Center Drive and a second shopping center driveway on West Branch Street immediately to the north of the IN-N-OUT site.

As noted in the previous section of this report, the intersection calculations for the north shopping center driveway on West Branch Street indicate that the outbound driveway traffic would degrade somewhat to LOS "C" delays. With the current striping, outbound vehicles must wait for clear traffic gaps in both directions on West Branch Street.

Consideration has also been given to the capacity of the southbound left turn lane and the potential for a refuge lane for outbound left turns on West Branch Street at the project driveway. The existing southbound left turn lane provides 155 feet of storage, a length sufficient for a 6-7 vehicle queue. Based on established volume criteria, the queue with IN-N-OUT traffic would be 6-7 vehicles in the PM peak hour and 8 vehicles in the mid-day peak hour. The existing lane would generally be adequate for the projected volume although the mid-day peak hour queue could exceed the storage length.[10] Again, it is noted that the actual existing queues were observed to be much shorter than calculated.

b. Vehicle Circulation

The site design provides a typical layout of drive aisles and parking spaces. All of the circulation reflects perpendicular parking spaces with two-way drive aisles. The two-way drive aisle design would allow for convenient internal access to/from the IN-N-OUT parking and drive-through lane.

c. Drive-Through Lane Design

The primary design issues regarding a drive-through lane are queuing capacity, access to the lane entrance and access for vehicles exiting the lane.

Based on actual surveys of existing IN-N-OUT restaurants in Atascadero and Santa Maria, peak mid-day drive-through queues average 9-10 vehicles with absolute maximum queues occurring during the peak 15 minute period of the 2-hour mid-day period of 14-18 vehicles.[11] The PM peak period observations indicate lesser queues with average queues of 8-9 vehicles and 13-14 vehicle maximum queues during the peak 15 minute period. The site plan provides queuing for 13 vehicles in the drive-through lane, and this length could accommodate the typical peak period queues. Additional vehicles could queue behind the lane without substantially interfering with the internal circulation. Vehicles would exit the lane directly into an internal roadway within the IN-N-OUT parking field. Vehicles would then exit the site via either the north shopping center driveway or Town Center Drive.

d. Pedestrian Access

Although the IN-N-OUT restaurant would not be expected to have a high proportion of pedestrian trips, the site plan includes enhanced pedestrian access to/from the West Branch Street/Town Center Drive intersection. The project would add an ADA pedestrian ramp between the restaurant and the sidewalk on the northwest side of Town center Drive. This feature would provide much more direct pedestrian access.

4. PROJECT PARKING

The proposed IN-N-OUT restaurant would have a total of 73 parking spaces (including 4 RV spaces). For restaurants, the Arroyo Grande Municipal Code requires one space for every 75 sq.ft. of public area within the restaurant.[12] The proposed IN-N-OUT would have 1,990 sq.ft. of public area, requiring a total of 27 parking spaces. The proposed project parking would substantially exceed the Code requirement.

In addition to the Zoning Code comparison, we have identified the parking demand based on observed parking at other IN-N-OUT restaurants.[13] Based on these surveys, the IN-N-OUT restaurant's peak parking demand (during the mid-day period) would be 42 spaces. The surveyed PM peak demand is lower at 32 spaces. The project's 73 space supply would be well in excess of this actual surveyed demand.

It is noted that the Central Coast area attracts visitors with trailers, RV's and other large vehicles. If these larger vehicles park in standard parking spaces, there would be potential problems with vehicle conflicts, access and internal circulation. Thus, the site plan includes 4 larger sized RV spaces.

5. CONCLUSIONS AND RECOMMENDATIONS

With the IN-N-OUT restaurant, operations would remain LOS "D" or better at the study intersections. The IN-N-OUT project traffic increases (compared with the existing peak hour volumes) would not be measurable within typical daily fluctuations in traffic flows.

In the cumulative scenario, the year 2030 conditions (without the IN-N-OUT project) would generally be at an acceptable LOS "D" or better, but the West Branch Street/Camino Mercado-Highway 1 Northbound Ramps intersection would degrade to LOS "E". A recommended widening of the northbound approach would return this intersection's operation to LOS "D". Conditions would be unchanged with the IN-N-OUT trips.

In terms of access, the site plan would generally be satisfactory. The north driveway on West Branch Street and Town center Drive would provide alternative routes for inbound and outbound traffic. Although the north driveway would operate satisfactorily with the IN-N-OUT project (LOS "C" for outbound traffic), it is recommended that the median lane in West Branch Street be restriped to provide a two-way-left-turn-lane (TWLTL). With this TWLTL, outbound traffic would be improved to LOS "B", and access convenience would be improved for the shopping center. The TWLTL should also be extended to the north, resulting in about 250 feet of left turn storage for vehicles entering the driveway. This length would be ample for the expected left turn volumes.

The site plan provides a drive-through lane that could accommodate the typical peak period queues. Additional vehicles could queue behind the lane without substantially interfering with the internal circulation.

The project's proposed 73 parking spaces would exceed the City Zoning Code calculation and the actual demand as surveyed at other IN-N-OUT restaurants. Because this restaurant could attract a higher number of customers with trailers, RV's and other large vehicles, the parking layout includes 4 spaces that would be longer and more readily accessed for these larger vehicles.

I trust that this evaluation responds to the needs of the City of Arroyo Grande. Please contact me if there are questions or if further input is needed.

Sincerely,

George W. Nickelson, P.E

References:

(1) Mr. Rob Strong, Community Development Director, City of Arroyo Grande, July 24, 2009.

(2) Wood-Rodgers, *Technical Memorandum for the SR 101/Brisco Road/Halcyon Road Interchange Modifications*, August 8, 2005.

(3) George W. Nickelson, P.E., traffic counts conducted on July 24, 2009.

(4) Caltrans Traffic Data Branch, 2005-2008 volume data.

(5) Caltrans, *Guidelines for Reconstruction of Intersections,* August 1985. The maximum peak hour southbound left turn volume is 157 vehicles, requiring a 5 vehicle storage, calculated as follows:

- 157 hourly vehicles/60 x 2 minutes of storage = 5 vehicles.

(6) George W. Nickelson, P.E., traffic counts, parking surveys and drive-through service queue surveys conducted at the IN-N-OUT restaurants in Atascadero and Santa Maria, July 23-24, 2009. Traffic counts, parking surveys and drive-through surveys at the Mt. View and Sunnyvale IN-N-OUT restaurants, May 6-7, 2009. Traffic counts, parking surveys and drive-through surveys at the Livermore, Pleasanton and Pittsburg IN-N-OUT restaurants, January-February 2005.

(7) San Diego Association of Governments (SANDAG), *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002.

(8) Mr. Mark Noack, IN-N-OUT Burger, August 18, 2009.

(9) Wood-Rodgers, *Technical Memorandum for the SR 101/Brisco Road/Halcyon Road Interchange Modifications – "Alternative 3A" Traffic Operations Analysis*, April 14, 2008.

(10) Caltrans, *Guidelines for Reconstruction of Intersections,* August 1985. The maximum peak hour southbound left turn volumes would be 201 PM peak hour vehicles and 234 mid-day peak hour vehicles, requiring 6-7 and 8 vehicle storage capacities, calculated as follows:

- 201 hourly vehicles/60 x 2 minutes of storage = 6-7 vehicles
- 234 hourly vehicles/60 x 2 minutes of storage = 8 vehicles

(11) (see reference 6)

(12) City of Arroyo Grande, *Municipal Code*, October 28, 2008.

(13) (see reference 6)

APPENDICES

- Level of Service Definitions
- Level of Service Calculations

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE	SIGNALIZED INTERSECTIONS	UNSIGNALIZED INTERSECTIONS*
"A"	Uncongested operations, all queues clear in a single-signal cycle. (Average stopped delay less than 10 seconds per vehicle; V/C less than or = 0.60).	Little or no delay. (Average delay of $\leq$ 10 seconds)
"B"	Uncongested operations, all queues clear in a single cycle. (Average delay of 10-20 seconds; V/C=0.61-0.70).	Short traffic delays. (Average delay of >10 and $\leq$15 secs.)
"C"	Light congestion, occasional backups on critical approaches. (Average delay of 20-35 seconds; V/C=0.71-0.80).	Average traffic delay. (Average delay of >15 and $\leq$25 secs.)
"D"	Significant congestion of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. (Average delay of 35-55 seconds; V/C=0.81-0.90).	Long traffic delays for some approaches. (Average delay of >25 and $\leq$35 secs.)
"E"	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). (Average delay of 55-80 seconds; V/C=0.91-1.00).	Very long traffic delays for some approaches. (Average delay of >35 and $\leq$50 secs.)
"F"	Total breakdown, stop-and-go operation. (Average delay in excess of 80 seconds; V/C of 1.01 or greater).	Extreme traffic delays for some approaches (intersection may be blocked by external causes--delays >50 seconds).

* Level of Service refers to delays encountered by certain stop sign controlled approaches. Other approaches may operate with little delay.

Source: Transportation Research Board, Highway Capacity Manual, 2000.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	0.95	0.95	1.00	0.95		1.00	0.95	
Frt				1.00	0.88	0.85	1.00	0.93		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1770	1563	1504	1770	3287		1770	3412	
Flt Permitted				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)				1770	1563	1504	1770	3287		1770	3412	
Volume (vph)	0	0	0	367	38	283	217	493	445	116	621	195
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	399	41	308	236	536	484	126	675	212
RTOR Reduction (vph)	0	0	0	0	104	120	0	278	0	0	53	0
Lane Group Flow (vph)	0	0	0	399	80	45	236	742	0	126	834	0
Turn Type				Prot		Perm	Prot			Prot		
Protected Phases				3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)				14.7	14.7	14.7	9.5	22.8		4.7	18.0	
Effective Green, g (s)				14.7	14.7	14.7	9.5	22.8		4.7	18.0	
Actuated g/C Ratio				0.27	0.27	0.27	0.18	0.42		0.09	0.33	
Clearance Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				480	424	408	310	1383		153	1133	
v/s Ratio Prot				c0.23	0.05		c0.13	0.23		0.07	c0.24	
v/s Ratio Perm						0.03						
v/c Ratio				0.83	0.19	0.11	0.76	0.54		0.82	0.74	
Uniform Delay, d1				18.6	15.2	14.8	21.3	11.7		24.3	16.0	
Progression Factor				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2				11.7	0.2	0.1	10.5	1.5		28.7	4.3	
Delay (s)				30.2	15.4	15.0	31.8	13.2		53.1	20.3	
Level of Service				C	B	B	C	B		D	C	
Approach Delay (s)		0.0			23.2			16.7			24.4	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	54.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.88		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3531		1770	1852		1770	1630		1770	1648	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3531		1770	1852		1770	1630		1770	1648	
Volume (vph)	43	478	7	226	309	12	242	4	18	8	11	37
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	520	8	246	336	13	263	4	20	9	12	40
RTOR Reduction (vph)	0	2	0	0	3	0	0	14	0	0	34	0
Lane Group Flow (vph)	47	526	0	246	346	0	263	10	0	9	18	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.9	12.2		9.9	20.2		10.7	18.4		0.5	8.2	
Effective Green, g (s)	2.4	12.7		10.4	20.7		11.2	18.9		1.0	8.7	
Actuated g/C Ratio	0.04	0.22		0.18	0.35		0.19	0.32		0.02	0.15	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	72	760		312	650		336	522		30	243	
v/s Ratio Prot	0.03	c0.15		c0.14	0.19		c0.15	0.01		0.01	c0.01	
v/s Ratio Perm												
v/c Ratio	0.65	0.69		0.79	0.53		0.78	0.02		0.30	0.07	
Uniform Delay, d1	27.9	21.4		23.2	15.3		22.7	13.7		28.7	21.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.2	2.7		12.4	0.8		11.3	0.1		5.6	0.6	
Delay (s)	47.1	24.1		35.7	16.1		34.0	13.8		34.2	22.3	
Level of Service	D	C		D	B		C	B		C	C	
Approach Delay (s)		26.0			24.2			32.3			24.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Volume (vph)	115	438	80	169	459	86
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	476	87	184	499	93
RTOR Reduction (vph)	0	384	0	0	0	46
Lane Group Flow (vph)	125	92	87	184	499	47
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	9.8	9.8	3.2	17.0	25.8	25.8
Effective Green, g (s)	9.8	9.8	3.2	17.0	25.8	25.8
Actuated g/C Ratio	0.19	0.19	0.06	0.33	0.51	0.51
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	359	305	111	623	899	804
v/s Ratio Prot	0.07		c0.05	c0.10	c0.28	
v/s Ratio Perm		0.06				0.03
v/c Ratio	0.35	0.30	0.78	0.30	0.56	0.06
Uniform Delay, d1	17.7	17.6	23.5	12.5	8.6	6.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.6	29.4	0.3	2.5	0.1
Delay (s)	18.3	18.1	52.9	12.7	11.0	6.5
Level of Service	B	B	D	B	B	A
Approach Delay (s)	18.2			25.6	10.3	
Approach LOS	B			C	B	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	0.88		1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00	0.85		1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	
Satd. Flow (prot)	1770	1810		1770	1863	2787		1849	1583		1791	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	
Satd. Flow (perm)	1770	1810		1770	1863	2787		1849	1583		1791	
Volume (vph)	33	186	43	49	86	367	44	250	36	342	179	38
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	202	47	53	93	399	48	272	39	372	195	41
RTOR Reduction (vph)	0	9	0	0	0	327	0	0	31	0	3	0
Lane Group Flow (vph)	36	240	0	53	93	72	0	320	8	0	605	0
Turn Type	Prot			Prot		Perm	Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8			2			
Actuated Green, G (s)	2.3	15.3		3.1	16.1	16.1		19.1	19.1		35.2	
Effective Green, g (s)	2.3	15.3		3.1	16.1	16.1		19.1	19.1		35.2	
Actuated g/C Ratio	0.03	0.17		0.03	0.18	0.18		0.22	0.22		0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	46	312		62	338	506		398	341		711	
v/s Ratio Prot	0.02	c0.13		c0.03	0.05			c0.17			c0.34	
v/s Ratio Perm						0.03			0.01			
v/c Ratio	0.78	0.77		0.85	0.28	0.14		0.80	0.02		0.85	
Uniform Delay, d1	43.0	35.0		42.6	31.3	30.5		33.0	27.5		24.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	57.8	10.8		65.1	0.4	0.1		15.7	0.1		12.2	
Delay (s)	100.7	45.9		107.7	31.7	30.6		48.8	27.6		36.6	
Level of Service	F	D		F	C	C		D	C		D	
Approach Delay (s)		52.8			38.3			46.5			36.6	
Approach LOS		D			D			D			D	

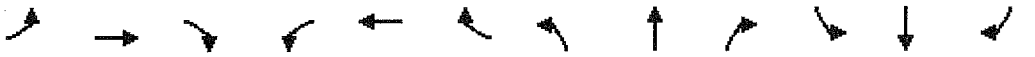
Intersection Summary			
HCM Average Control Delay	41.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		0.95	0.95			1.00	1.00
Frt	1.00	0.86		1.00	0.97		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.96			1.00	1.00
Satd. Flow (prot)	1770	1601		1770	1801		1681	1677			1859	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.96			1.00	1.00
Satd. Flow (perm)	1770	1601		1770	1801		1681	1677			1859	1583
Volume (vph)	198	22	331	21	29	8	318	25	20	10	246	196
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	24	360	23	32	9	346	27	22	11	267	213
RTOR Reduction (vph)	0	290	0	0	9	0	0	6	0	0	0	157
Lane Group Flow (vph)	215	94	0	23	32	0	198	191	0	0	278	56
Turn Type	Prot			Prot			Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	10.5	12.1		1.4	3.0		16.2	16.2			16.2	16.2
Effective Green, g (s)	10.5	12.1		1.4	3.0		16.2	16.2			16.2	16.2
Actuated g/C Ratio	0.17	0.20		0.02	0.05		0.26	0.26			0.26	0.26
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	300	313		40	87		440	439			487	414
v/s Ratio Prot	c0.12	c0.06		0.01	0.02		c0.12	0.11			c0.15	
v/s Ratio Perm												0.04
v/c Ratio	0.72	0.30		0.57	0.37		0.45	0.44			0.57	0.13
Uniform Delay, d1	24.3	21.3		30.0	28.5		19.1	19.0			19.8	17.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	7.9	0.5		18.4	2.7		3.3	3.1			4.8	0.7
Delay (s)	32.2	21.8		48.4	31.2		22.4	22.2			24.6	18.2
Level of Service	C	C		D	C		C	C			C	B
Approach Delay (s)		25.6			37.4			22.3			21.8	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	0.95	0.95	1.00	0.95		1.00	0.95	
Frt				1.00	0.88	0.85	1.00	0.93		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1770	1562	1504	1770	3285		1770	3412	
Flt Permitted				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)				1770	1562	1504	1770	3285		1770	3412	
Volume (vph)	0	0	0	376	38	289	217	493	453	120	621	195
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	409	41	314	236	536	492	130	675	212
RTOR Reduction (vph)	0	0	0	0	106	122	0	283	0	0	53	0
Lane Group Flow (vph)	0	0	0	409	81	46	236	745	0	130	834	0
Turn Type				Prot		Perm	Prot			Prot		
Protected Phases				3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)				14.9	14.9	14.9	9.5	22.8		4.7	18.0	
Effective Green, g (s)				14.9	14.9	14.9	9.5	22.8		4.7	18.0	
Actuated g/C Ratio				0.27	0.27	0.27	0.17	0.42		0.09	0.33	
Clearance Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				485	428	412	309	1377		153	1129	
v/s Ratio Prot				c0.23	0.05		c0.13	0.23		0.07	c0.24	
v/s Ratio Perm						0.03						
v/c Ratio				0.84	0.19	0.11	0.76	0.54		0.85	0.74	
Uniform Delay, d1				18.6	15.1	14.8	21.4	11.9		24.5	16.1	
Progression Factor				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2				12.6	0.2	0.1	10.7	1.5		33.2	4.3	
Delay (s)				31.3	15.3	14.9	32.1	13.4		57.7	20.5	
Level of Service				C	B	B	C	B		E	C	
Approach Delay (s)		0.0			23.8			16.9			25.2	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	54.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.87		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3531		1770	1853		1770	1626		1770	1648	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3531		1770	1853		1770	1626		1770	1648	
Volume (vph)	43	490	7	234	324	12	242	4	20	8	11	37
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	533	8	254	352	13	263	4	22	9	12	40
RTOR Reduction (vph)	0	2	0	0	3	0	0	15	0	0	34	0
Lane Group Flow (vph)	47	539	0	254	362	0	263	11	0	9	18	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.9	12.1		10.0	20.2		10.7	18.4		0.5	8.2	
Effective Green, g (s)	2.4	12.6		10.5	20.7		11.2	18.9		1.0	8.7	
Actuated g/C Ratio	0.04	0.21		0.18	0.35		0.19	0.32		0.02	0.15	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	72	754		315	650		336	521		30	243	
v/s Ratio Prot	0.03	c0.15		c0.14	0.20		c0.15	0.01		0.01	c0.01	
v/s Ratio Perm												
v/c Ratio	0.65	0.72		0.81	0.56		0.78	0.02		0.30	0.07	
Uniform Delay, d1	27.9	21.5		23.3	15.5		22.7	13.7		28.7	21.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.2	3.2		13.9	1.0		11.3	0.1		5.6	0.6	
Delay (s)	47.1	24.8		37.2	16.5		34.0	13.8		34.2	22.3	
Level of Service	D	C		D	B		C	B		C	C	
Approach Delay (s)		26.6			25.0			32.2			24.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Volume (vph)	124	446	80	175	465	86
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	485	87	190	505	93
RTOR Reduction (vph)	0	388	0	0	0	46
Lane Group Flow (vph)	135	97	87	190	505	47
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	10.2	10.2	3.2	17.4	25.8	25.8
Effective Green, g (s)	10.2	10.2	3.2	17.4	25.8	25.8
Actuated g/C Ratio	0.20	0.20	0.06	0.34	0.50	0.50
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	371	315	111	633	892	798
v/s Ratio Prot	0.07		c0.05	c0.10	c0.29	
v/s Ratio Perm		0.06				0.03
v/c Ratio	0.36	0.31	0.78	0.30	0.57	0.06
Uniform Delay, d1	17.7	17.5	23.7	12.4	8.8	6.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.6	29.4	0.3	2.6	0.1
Delay (s)	18.3	18.0	53.1	12.7	11.4	6.6
Level of Service	B	B	D	B	B	A
Approach Delay (s)	18.1			25.4	10.7	
Approach LOS	B			C	B	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	0.88		1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00	0.85		1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	
Satd. Flow (prot)	1770	1810		1770	1863	2787		1849	1583		1791	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	
Satd. Flow (perm)	1770	1810		1770	1863	2787		1849	1583		1791	
Volume (vph)	33	186	43	49	86	372	44	250	36	350	179	38
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	202	47	53	93	404	48	272	39	380	195	41
RTOR Reduction (vph)	0	9	0	0	0	331	0	0	31	0	3	0
Lane Group Flow (vph)	36	240	0	53	93	73	0	320	8	0	613	0
Turn Type	Prot			Prot		Perm	Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8			2			
Actuated Green, G (s)	2.3	15.3		3.1	16.1	16.1		19.1	19.1		35.2	
Effective Green, g (s)	2.3	15.3		3.1	16.1	16.1		19.1	19.1		35.2	
Actuated g/C Ratio	0.03	0.17		0.03	0.18	0.18		0.22	0.22		0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	46	312		62	338	506		398	341		711	
v/s Ratio Prot	0.02	c0.13		c0.03	0.05			c0.17			c0.34	
v/s Ratio Perm						0.03			0.01			
v/c Ratio	0.78	0.77		0.85	0.28	0.14		0.80	0.02		0.86	
Uniform Delay, d1	43.0	35.0		42.6	31.3	30.5		33.0	27.5		24.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	57.8	10.8		65.1	0.4	0.1		15.7	0.1		13.1	
Delay (s)	100.7	45.9		107.7	31.7	30.6		48.8	27.6		37.6	
Level of Service	F	D		F	C	C		D	C		D	
Approach Delay (s)		52.8			38.2			46.5			37.6	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	41.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		0.95	0.95			1.00	1.00
Frt	1.00	0.86		1.00	0.97		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.96			1.00	1.00
Satd. Flow (prot)	1770	1601		1770	1801		1681	1677			1859	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.96			1.00	1.00
Satd. Flow (perm)	1770	1601		1770	1801		1681	1677			1859	1583
Volume (vph)	202	22	335	21	29	8	321	25	20	10	246	198
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	24	364	23	32	9	349	27	22	11	267	215
RTOR Reduction (vph)	0	292	0	0	9	0	0	6	0	0	0	159
Lane Group Flow (vph)	220	96	0	23	32	0	199	193	0	0	278	56
Turn Type	Prot			Prot			Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	10.6	12.2		1.4	3.0		16.2	16.2			16.2	16.2
Effective Green, g (s)	10.6	12.2		1.4	3.0		16.2	16.2			16.2	16.2
Actuated g/C Ratio	0.17	0.20		0.02	0.05		0.26	0.26			0.26	0.26
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	303	315		40	87		439	438			486	414
v/s Ratio Prot	c0.12	c0.06		0.01	0.02		c0.12	0.12			c0.15	
v/s Ratio Perm												0.04
v/c Ratio	0.73	0.30		0.57	0.37		0.45	0.44			0.57	0.14
Uniform Delay, d1	24.3	21.3		30.0	28.6		19.2	19.1			19.9	17.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	8.4	0.5		18.4	2.7		3.4	3.2			4.8	0.7
Delay (s)	32.7	21.8		48.4	31.3		22.5	22.3			24.7	18.2
Level of Service	C	C		D	C		C	C			C	B
Approach Delay (s)		25.8			37.4			22.4			21.9	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	0.95	0.95	1.00	0.95		1.00	0.95	
Frt				1.00	0.90	0.85	1.00	0.93		1.00	0.97	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1770	1600	1504	1770	3299		1770	3421	
Flt Permitted				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)				1770	1600	1504	1770	3299		1770	3421	
Volume (vph)	0	0	0	524	75	343	338	730	601	150	884	253
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	570	82	373	367	793	653	163	961	275
RTOR Reduction (vph)	0	0	0	0	71	157	0	166	0	0	29	0
Lane Group Flow (vph)	0	0	0	570	156	71	367	1280	0	163	1207	0
Turn Type				Prot		Perm	Prot			Prot		
Protected Phases				3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)				28.0	28.0	28.0	18.0	41.0		9.0	32.0	
Effective Green, g (s)				28.0	28.0	28.0	18.0	41.0		9.0	32.0	
Actuated g/C Ratio				0.31	0.31	0.31	0.20	0.46		0.10	0.36	
Clearance Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				551	498	468	354	1503		177	1216	
v/s Ratio Prot				c0.32	0.10		c0.21	0.39		0.09	c0.35	
v/s Ratio Perm						0.05						
v/c Ratio				1.03	0.31	0.15	1.04	0.85		0.92	0.99	
Uniform Delay, d1				31.0	23.7	22.4	36.0	21.8		40.1	28.9	
Progression Factor				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2				47.5	0.4	0.2	57.7	6.3		45.4	24.1	
Delay (s)				78.5	24.0	22.6	93.7	28.1		85.5	53.0	
Level of Service				E	C	C	F	C		F	D	
Approach Delay (s)		0.0			54.0			41.4			56.8	
Approach LOS		A			D			D			E	

Intersection Summary			
HCM Average Control Delay	49.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3500		1770	1827		1770	1668		1770	1626	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3500		1770	1827		1770	1668		1770	1626	
Volume (vph)	117	524	41	667	294	43	310	21	49	45	22	122
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	570	45	725	320	47	337	23	53	49	24	133
RTOR Reduction (vph)	0	6	0	0	5	0	0	42	0	0	123	0
Lane Group Flow (vph)	127	609	0	725	362	0	337	34	0	49	34	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.7	17.5		39.5	45.3		18.6	20.7		5.2	7.3	
Effective Green, g (s)	12.2	18.0		40.0	45.8		19.1	21.2		5.7	7.8	
Actuated g/C Ratio	0.12	0.18		0.40	0.45		0.19	0.21		0.06	0.08	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	214	624		702	829		335	350		100	126	
v/s Ratio Prot	0.07	c0.17		c0.41	0.20		c0.19	0.02		0.03	c0.02	
v/s Ratio Perm												
v/c Ratio	0.59	0.98		1.03	0.44		1.01	0.10		0.49	0.27	
Uniform Delay, d1	42.0	41.2		30.5	18.8		40.9	32.1		46.2	43.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	29.8		42.7	0.4		50.7	0.6		3.7	5.3	
Delay (s)	46.4	71.1		73.1	19.1		91.6	32.7		49.9	49.1	
Level of Service	D	E		E	B		F	C		D	D	
Approach Delay (s)		66.8			55.0			80.7			49.3	
Approach LOS		E			D			F			D	

Intersection Summary			
HCM Average Control Delay	62.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	1863	1583	1770	1863	3388	
Flt Permitted	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (perm)	1863	1583	1770	1863	3388	
Volume (vph)	275	669	132	447	894	159
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	299	727	143	486	972	173
RTOR Reduction (vph)	0	536	0	0	23	0
Lane Group Flow (vph)	299	191	143	486	1122	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Actuated Green, G (s)	14.9	14.9	5.3	24.2	24.4	
Effective Green, g (s)	14.9	14.9	5.3	24.2	24.4	
Actuated g/C Ratio	0.26	0.26	0.09	0.43	0.43	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	490	417	166	797	1461	
v/s Ratio Prot	0.16		c0.08	c0.26	c0.33	
v/s Ratio Perm		0.12				
v/c Ratio	0.61	0.46	0.86	0.61	0.77	
Uniform Delay, d1	18.3	17.5	25.3	12.5	13.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.2	0.8	33.9	1.3	3.9	
Delay (s)	20.5	18.3	59.2	13.9	17.6	
Level of Service	C	B	E	B	B	
Approach Delay (s)	18.9			24.2	17.6	
Approach LOS	B			C	B	

Intersection Summary			
HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	0.88		1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85		1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1764		1770	1863	2787		1850	1583	1770	1799	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1764		1770	1863	2787		1850	1583	1770	1799	
Volume (vph)	86	214	118	74	103	575	60	392	55	442	277	82
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	233	128	80	112	625	65	426	60	480	301	89
RTOR Reduction (vph)	0	21	0	0	0	500	0	0	43	0	12	0
Lane Group Flow (vph)	93	340	0	80	112	125	0	491	17	480	378	0
Turn Type	Prot			Prot		Perm	Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8			2			
Actuated Green, G (s)	5.6	18.8		5.0	18.2	18.2		26.0	26.0	25.0	25.0	
Effective Green, g (s)	5.6	18.8		5.0	18.2	18.2		26.0	26.0	25.0	25.0	
Actuated g/C Ratio	0.06	0.21		0.06	0.20	0.20		0.29	0.29	0.28	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	109	365		97	373	559		530	453	487	495	
v/s Ratio Prot	c0.05	c0.19		0.05	0.06			c0.27		c0.27	0.21	
v/s Ratio Perm						0.04			0.01			
v/c Ratio	0.85	0.93		0.82	0.30	0.22		0.93	0.04	0.99	0.76	
Uniform Delay, d1	42.2	35.4		42.5	30.9	30.4		31.5	23.4	32.7	30.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	43.8	29.9		40.9	0.5	0.2		24.6	0.2	37.4	10.7	
Delay (s)	86.0	65.3		83.4	31.3	30.6		56.0	23.5	70.1	40.9	
Level of Service	F	E		F	C	C		E	C	E	D	
Approach Delay (s)		69.5			35.9			52.5			57.0	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM Average Control Delay	51.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		0.95	0.95			1.00	1.00
Frt	1.00	0.86		1.00	0.95		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.97			1.00	1.00
Satd. Flow (prot)	1770	1602		1770	1772		1681	1676			1859	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.97			1.00	1.00
Satd. Flow (perm)	1770	1602		1770	1772		1681	1676			1859	1583
Volume (vph)	308	28	375	34	76	37	447	48	37	18	388	229
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	335	30	408	37	83	40	486	52	40	20	422	249
RTOR Reduction (vph)	0	293	0	0	20	0	0	6	0	0	0	183
Lane Group Flow (vph)	335	145	0	37	103	0	289	283	0	0	442	66
Turn Type	Prot			Prot			Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	17.5	23.5		3.4	9.4		18.2	18.2			22.2	22.2
Effective Green, g (s)	17.5	23.5		3.4	9.4		18.2	18.2			22.2	22.2
Actuated g/C Ratio	0.21	0.28		0.04	0.11		0.22	0.22			0.27	0.27
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	372	452		72	200		367	366			495	422
v/s Ratio Prot	c0.19	0.09		0.02	c0.06		c0.17	0.17			c0.24	
v/s Ratio Perm												0.04
v/c Ratio	0.90	0.32		0.51	0.51		0.79	0.77			0.89	0.16
Uniform Delay, d1	32.1	23.6		39.1	34.8		30.7	30.6			29.4	23.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	24.0	0.4		6.1	2.2		15.6	14.6			21.1	0.8
Delay (s)	56.0	24.0		45.2	37.0		46.3	45.2			50.5	24.2
Level of Service	E	C		D	D		D	D			D	C
Approach Delay (s)		37.9			38.9			45.8			41.0	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	41.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	83.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	0.95	0.95	1.00	0.95		1.00	0.95	
Frt				1.00	0.90	0.85	1.00	0.93		1.00	0.97	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1770	1599	1504	1770	3298		1770	3421	
Flt Permitted				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)				1770	1599	1504	1770	3298		1770	3421	
Volume (vph)	0	0	0	532	75	349	338	730	609	154	884	253
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	578	82	379	367	793	662	167	961	275
RTOR Reduction (vph)	0	0	0	0	72	159	0	168	0	0	29	0
Lane Group Flow (vph)	0	0	0	578	158	72	367	1287	0	167	1207	0
Turn Type				Prot		Perm	Prot			Prot		
Protected Phases				3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)				28.0	28.0	28.0	18.0	41.0		9.0	32.0	
Effective Green, g (s)				28.0	28.0	28.0	18.0	41.0		9.0	32.0	
Actuated g/C Ratio				0.31	0.31	0.31	0.20	0.46		0.10	0.36	
Clearance Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				551	497	468	354	1502		177	1216	
v/s Ratio Prot				c0.33	0.10		c0.21	0.39		0.09	c0.35	
v/s Ratio Perm						0.05						
v/c Ratio				1.05	0.32	0.15	1.04	0.86		0.94	0.99	
Uniform Delay, d1				31.0	23.7	22.4	36.0	21.9		40.2	28.9	
Progression Factor				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2				51.8	0.4	0.2	57.7	6.5		51.0	24.1	
Delay (s)				82.8	24.1	22.6	93.7	28.4		91.3	53.0	
Level of Service				F	C	C	F	C		F	D	
Approach Delay (s)		0.0			56.4			41.6			57.5	
Approach LOS		A			E			D			E	

Intersection Summary			
HCM Average Control Delay	50.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3501		1770	1828		1770	1666		1770	1626	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3501		1770	1828		1770	1666		1770	1626	
Volume (vph)	117	536	41	675	309	43	310	21	51	45	22	122
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	583	45	734	336	47	337	23	55	49	24	133
RTOR Reduction (vph)	0	6	0	0	5	0	0	43	0	0	123	0
Lane Group Flow (vph)	127	622	0	734	378	0	337	35	0	49	34	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.7	17.5		39.5	45.3		18.6	20.7		5.2	7.3	
Effective Green, g (s)	12.2	18.0		40.0	45.8		19.1	21.2		5.7	7.8	
Actuated g/C Ratio	0.12	0.18		0.40	0.45		0.19	0.21		0.06	0.08	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	214	625		702	830		335	350		100	126	
v/s Ratio Prot	0.07	c0.18		c0.41	0.21		c0.19	0.02		0.03	c0.02	
v/s Ratio Perm												
v/c Ratio	0.59	1.00		1.05	0.46		1.01	0.10		0.49	0.27	
Uniform Delay, d1	42.0	41.4		30.5	19.0		40.9	32.1		46.2	43.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	34.7		46.5	0.4		50.7	0.6		3.7	5.3	
Delay (s)	46.4	76.1		76.9	19.4		91.6	32.7		49.9	49.1	
Level of Service	D	E		E	B		F	C		D	D	
Approach Delay (s)		71.1			57.2			80.5			49.3	
Approach LOS		E			E			F			D	

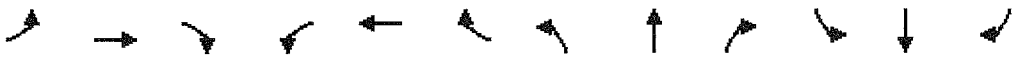
Intersection Summary			
HCM Average Control Delay	64.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	1863	1583	1770	1863	3388	
Flt Permitted	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (perm)	1863	1583	1770	1863	3388	
Volume (vph)	284	677	132	453	900	159
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	309	736	143	492	978	173
RTOR Reduction (vph)	0	541	0	0	23	0
Lane Group Flow (vph)	309	195	143	492	1128	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Actuated Green, G (s)	15.0	15.0	5.3	24.3	24.4	
Effective Green, g (s)	15.0	15.0	5.3	24.3	24.4	
Actuated g/C Ratio	0.26	0.26	0.09	0.43	0.43	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	493	419	165	798	1458	
v/s Ratio Prot	0.17		c0.08	c0.26	c0.33	
v/s Ratio Perm		0.12				
v/c Ratio	0.63	0.46	0.87	0.62	0.77	
Uniform Delay, d1	18.4	17.5	25.4	12.6	13.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5	0.8	34.8	1.4	4.1	
Delay (s)	20.9	18.3	60.2	14.0	17.8	
Level of Service	C	B	E	B	B	
Approach Delay (s)	19.1			24.4	17.8	
Approach LOS	B			C	B	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	56.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	0.88		1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85		1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1764		1770	1863	2787		1850	1583	1770	1799	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1764		1770	1863	2787		1850	1583	1770	1799	
Volume (vph)	86	214	118	74	103	580	60	392	55	450	277	82
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	233	128	80	112	630	65	426	60	489	301	89
RTOR Reduction (vph)	0	21	0	0	0	504	0	0	43	0	12	0
Lane Group Flow (vph)	93	340	0	80	112	126	0	491	17	489	378	0
Turn Type	Prot			Prot		Perm	Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8			2			
Actuated Green, G (s)	5.6	18.8		5.0	18.2	18.2		26.0	26.0	25.0	25.0	
Effective Green, g (s)	5.6	18.8		5.0	18.2	18.2		26.0	26.0	25.0	25.0	
Actuated g/C Ratio	0.06	0.21		0.06	0.20	0.20		0.29	0.29	0.28	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	109	365		97	373	559		530	453	487	495	
v/s Ratio Prot	c0.05	c0.19		0.05	0.06			c0.27		c0.28	0.21	
v/s Ratio Perm						0.05			0.01			
v/c Ratio	0.85	0.93		0.82	0.30	0.23		0.93	0.04	1.00	0.76	
Uniform Delay, d1	42.2	35.4		42.5	30.9	30.4		31.5	23.4	32.9	30.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	43.8	29.9		40.9	0.5	0.2		24.6	0.2	41.8	10.7	
Delay (s)	86.0	65.3		83.4	31.3	30.6		56.0	23.5	74.7	40.9	
Level of Service	F	E		F	C	C		E	C	E	D	
Approach Delay (s)		69.5			35.8			52.5			59.7	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM Average Control Delay	52.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		0.95	0.95			1.00	1.00
Frt	1.00	0.86		1.00	0.95		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.97			1.00	1.00
Satd. Flow (prot)	1770	1602		1770	1772		1681	1676			1859	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.97			1.00	1.00
Satd. Flow (perm)	1770	1602		1770	1772		1681	1676			1859	1583
Volume (vph)	312	28	379	34	76	37	450	48	37	18	388	231
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	339	30	412	37	83	40	489	52	40	20	422	251
RTOR Reduction (vph)	0	295	0	0	20	0	0	6	0	0	0	184
Lane Group Flow (vph)	339	147	0	37	103	0	290	285	0	0	442	67
Turn Type	Prot			Prot			Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	17.7	23.7		3.4	9.4		18.2	18.2			22.2	22.2
Effective Green, g (s)	17.7	23.7		3.4	9.4		18.2	18.2			22.2	22.2
Actuated g/C Ratio	0.21	0.28		0.04	0.11		0.22	0.22			0.27	0.27
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	375	455		72	199		366	365			494	421
v/s Ratio Prot	c0.19	0.09		0.02	c0.06		c0.17	0.17			c0.24	
v/s Ratio Perm												0.04
v/c Ratio	0.90	0.32		0.51	0.52		0.79	0.78			0.89	0.16
Uniform Delay, d1	32.1	23.6		39.2	34.9		30.9	30.8			29.5	23.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	24.3	0.4		6.1	2.2		16.0	15.2			21.3	0.8
Delay (s)	56.4	24.0		45.3	37.2		46.9	45.9			50.9	24.3
Level of Service	E	C		D	D		D	D			D	C
Approach Delay (s)		38.0			39.0			46.4			41.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	41.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	83.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3500		3433	1827		1770	1668		1770	1626	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3500		3433	1827		1770	1668		1770	1626	
Volume (vph)	117	524	41	667	294	43	310	21	49	45	22	122
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	570	45	725	320	47	337	23	53	49	24	133
RTOR Reduction (vph)	0	9	0	0	8	0	0	38	0	0	116	0
Lane Group Flow (vph)	127	606	0	725	359	0	337	38	0	49	41	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.5	13.4		14.5	22.4		13.4	18.4		3.4	8.4	
Effective Green, g (s)	6.0	13.9		15.0	22.9		13.9	18.9		3.9	8.9	
Actuated g/C Ratio	0.09	0.21		0.22	0.34		0.21	0.28		0.06	0.13	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	157	719		761	618		363	466		102	214	
v/s Ratio Prot	0.07	c0.17		c0.21	0.20		c0.19	0.02		0.03	c0.03	
v/s Ratio Perm												
v/c Ratio	0.81	0.84		0.95	0.58		0.93	0.08		0.48	0.19	
Uniform Delay, d1	30.3	25.9		26.0	18.4		26.4	18.0		30.9	26.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.5	8.9		21.7	1.4		29.3	0.3		3.5	2.0	
Delay (s)	55.8	34.7		47.7	19.8		55.8	18.3		34.5	28.2	
Level of Service	E	C		D	B		E	B		C	C	
Approach Delay (s)		38.3			38.3			48.9			29.7	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	39.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	67.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3501		3433	1828		1770	1666		1770	1626	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3501		3433	1828		1770	1666		1770	1626	
Volume (vph)	117	536	41	675	309	43	310	21	51	45	22	122
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	583	45	734	336	47	337	23	55	49	24	133
RTOR Reduction (vph)	0	9	0	0	7	0	0	40	0	0	116	0
Lane Group Flow (vph)	127	619	0	734	376	0	337	38	0	49	41	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.5	13.4		14.5	22.4		13.4	18.4		3.4	8.4	
Effective Green, g (s)	6.0	13.9		15.0	22.9		13.9	18.9		3.9	8.9	
Actuated g/C Ratio	0.09	0.21		0.22	0.34		0.21	0.28		0.06	0.13	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	157	719		761	618		363	465		102	214	
v/s Ratio Prot	0.07	c0.18		c0.21	0.21		c0.19	0.02		0.03	c0.03	
v/s Ratio Perm												
v/c Ratio	0.81	0.86		0.96	0.61		0.93	0.08		0.48	0.19	
Uniform Delay, d1	30.3	26.0		26.1	18.7		26.4	18.0		30.9	26.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.5	10.3		24.0	1.7		29.3	0.3		3.5	2.0	
Delay (s)	55.8	36.3		50.1	20.4		55.8	18.4		34.5	28.2	
Level of Service	E	D		D	C		E	B		C	C	
Approach Delay (s)		39.6			39.9			48.7			29.7	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	40.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	67.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	ARROYO GRANDE 8/3/2009
Agency or Company	GWN	Major Street	WEST BRANCH
Analysis Period/Year	PM 2009	Minor Street	NORTH DRIVEWAY
Comment	EXISTING 2009 PM PEAK		

Input Data

Lane Configuration	EB	WB	NB	SB
Lane 1 (curb)	T	TR		LR
Lane 2	T	T		
Lane 3	L			
Lane 4				
Lane 5				

	EB			WB			NB			SB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	157	372			434	8				10		146
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	5	5			5	5				5		5
Flow rate	174	413			482	9				11		162
Flare storage (# of vehs)												
Median storage (# of vehs)										0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 1.00

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
NB	1								
	2								
	3								
SB	1	LR	173	624	0.277	1	13.0	B	13.0
	2								
	3								B
EB		(1)	174	1048	0.167	1	9.1	A	
WB		(4)							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*		
Analyst	GWN	Jurisdiction/Date	ARROYO GRANDE	8/3/2009
Agency or Company	GWN	Major Street	WEST BRANCH	
Analysis Period/Year	PM 2009	Minor Street	NORTH DRIVEWAY	
Comment	EXISTING 2009 PM PEAK +□□IN-N-OUT			

Input Data

Lane Configuration	EB	WB	NB	SB
Lane 1 (curb)	T	TR		LR
Lane 2	T	T		
Lane 3	L			
Lane 4				
Lane 5				

	EB			WB			NB			SB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	201	353			422	35				37		190
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	5	5			5	5				5		5
Flow rate	223	392			469	39				41		211
Flare storage (# of vehs)												
Median storage (# of vehs)										0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 1.00

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
NB	1								
	2								
	3								
SB	1	LR	252	451	0.558	4	22.9	C	22.9
	2								
	3								C
EB		①	223	1033	0.216	1	9.4	A	
WB		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	ARROYO GRANDE 8/3/2009
Agency or Company	GWN	Major Street	WEST BRANCH
Analysis Period/Year	PM 2009	Minor Street	NORTH DRIVEWAY
Comment	EXISTING 2009 PM PEAK +□□IN-N-OUT + TWLTL		

Input Data

Lane Configuration	EB	WB	NB	SB
Lane 1 (curb)	T	TR		LR
Lane 2	T	T		
Lane 3	L			
Lane 4				
Lane 5				

	EB			WB			NB			SB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	201	353			422	35				37		190
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	5	5			5	5				5		5
Flow rate	223	392			469	39				41		211
Flare storage (# of vehs)												
Median storage (# of vehs)										3		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 1.00

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
NB	1								
	2								
	3								
SB	1	LR	252	622	0.405	2	14.7	B	14.7
	2								
	3								B
EB		(1)	223	1033	0.216	1	9.4	A	
WB		(4)							

Attachment D

Draft MND

- Police Station – City of Arroyo Grande

INITIAL STUDY/DRAFT MITIGATED NEGATIVE DECLARATION

PROJECT TITLE
City of Arroyo Grande Police Station
West Branch Street at Rodeo Drive
APN 007-787-005
Conditional Use Permit 09-012 and Administrative Sign Permit 09-028

LEAD AGENCY and CONTACT PERSON
City of Arroyo Grande
Community Development Department
214 East Branch Street
Arroyo Grande, CA 93420
Contact: Jim Bergman, Planning Manager
(805) 473-5420

PROJECT APPLICANT
City of Arroyo Grande
214 East Branch Street
Arroyo Grande, CA 93420

PROJECT SITE CHARACTERISTICS
The project site is a vacant 1.3 acre parcel on the corner of West Branch Street and Rodeo Drive in the City of Arroyo Grande, CA. The property is vacant and is used occasionally for overflow parking for the adjacent St. Patrick's School. The parcel is generally flat but does rise in elevation to the north. The site contains native and non-native grasses and is mowed annually.

ISSUES:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
XV. TRANSPORTATION/TRAFFIC - Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?			**X**	
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?			**X**	
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				**X**
d) Substantially increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				**X**
e) Result in inadequate emergency access?				**X**
f) Result in inadequate parking capacity?				**X**
g) Conflict with adopted policies supporting alternative transportation (e.g., bus turnouts, bicycle racks)?		**X**		

a and b – Traffic related to police station uses is generally less than comparable sized office developments. The police department utilizes two shifts during each 24 hour period (6 am – 6 pm and 6 pm – 6 am). The day shift utilizes approximately 20 employees while 6 employees are assigned to the night shift. SANDAG trip generation rates indicate 14 trips per 1000 square feet for single tenant offices which is estimated to generate 292 trips per day. The addition of these trips onto Rodeo Drive, West Branch Street and surrounding intersections would have a less than significant impact.

c, d, e, f, and g - Based upon the cited documents, the project description and review of the project plan, no impacts related to safety risks will result due to design, emergency access, inadequate parking or alternative transportation.

MM XV-1: The applicant shall install sidewalks on the West Branch Street and Rodeo Drive frontage prior to occupancy.

ISSUES:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
XVI. UTILITIES AND SERVICE SYSTEMS - Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board? [1, 8]			**X**	
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects? [1, 8]			**X**	
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects? [1, 9]			**X**	
d) Are sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed? [1, 6]		**X**		
e) Has the wastewater treatment provider which serves or may serve the project determined that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments? [1, 6]			**X**	

Attachment E

Trip Generation Rates

- San Diego Association of Governments

(NOT SO)

BRIEF GUIDE OF VEHICULAR TRAFFIC GENERATION RATES FOR THE SAN DIEGO REGION

APRIL 2002

SANDAG
401 B Street, Suite 800
San Diego, California 92101
(619) 699-1900 • Fax (619) 699-1950

NOTE: This listing only represents a ***guide*** of average, or estimated, traffic generation "driveway" rates and some very general trip data for land uses (emphasis on acreage and building square footage) in the San Diego region. These rates (both local and national) are subject to change as future documentation becomes available, or as regional sources are updated. For more specific information regarding traffic data and trip rates, please refer to the San Diego Traffic Generators manual. ***Always check with local jurisdictions for their preferred or applicable rates.***

LAND USE	TRIP CATEGORIES [PRIMARY:DIVERTED:PASS-BY][P]	ESTIMATED WEEKDAY VEHICLE TRIP GENERATION RATE (DRIVEWAY)	HIGHEST PEAK HOUR % (plus IN:OUT ratio) Between 6:00-9:30 A.M.		Between 3:00-6:30 P.M.		TRIP LENGTH (Miles)[L]
AGRICULTURE (Open Space)	[80:18:2]	2/acre* *					10.8
AIRPORT	[78:20:2]						12.5
Commercial		60/acre, 100/flight, 70/1 000 sq. ft.* * *	5%	(6:4)	6%	(5:5)	
General Aviation		6/acre, 2/flight, 6/based aircraft* * *	9%	(7:3)	15%	(5:5)	
Heliports		100/acre* *					
AUTOMOBILE[S]							
Car Wash							
Automatic		900/site, 600/acre* *	4%	(5:5)	9%	(5:5)	
Self-serve		100/wash stall* *	4%	(5:5)	8%	(5:5)	
Gasoline	[21:51:28]						2.8
with/Food Mart		160/vehicle fueling space* *	7%	(5:5)	8%	(5:5)	
with/Food Mart & Car Wash		155/vehicle fueling space* *	8%	(5:5)	9%	(5:5)	
Older Service Station Design		150/vehicle fueling space, 900/station* *	7%	(5:5)	9%	(5:5)	
Sales (Dealer & Repair)		50/1 000 sq. ft., 300/acre, 60/service stall* * *	5%	(7:3)	8%	(4:6)	
Auto Repair Center		20/1 000 sq. ft., 400/acre, 20/service stall*	8%	(7:3)	11%	(4:6)	
Auto Parts Sales		60/1 000 sq. ft. * *	4%		10%		
Quick Lube		40/service stall* *	7%	(6:4)	10%	(5:5)	
Tire Store		25/1 000 sq. ft., 30/service stall* *	7%	(6:4)	11%	(5:5)	
CEMETERY		5/acre*					
CHURCH (or Synagogue)	[64:25:11]	9/1 000 sq. ft., 30/acre* * (quadruple rates for Sunday, or days of assembly)	5%	(6:4)	8%	(5:5)	5.1
COMMERCIAL/RETAIL[S]							
Super Regional Shopping Center (More than 80 acres, more than 800,000 sq. ft., w/usually 3+ major stores)		35/1 000 sq. ft.,[C] 400/acre*	4%	(7:3)	10%	(5:5)	
Regional Shopping Center (40-80acres, 400,000-800,000 sq. ft., w/usually 2+ major stores)	[54:35:11]	50/1 000 sq. ft.,[C] 500/acre*	4%	(7:3)	9%	(5:5)	5.2
Community Shopping Center (15-40 acres, 125,000-400,000 sq. ft., w/usually 1 major store, detached restaurant(s), grocery and drugstore)	[47:31:22]	80/1 000 sq. ft., 700/acre* * *	4%	(6:4)	10%	(5:5)	3.6
Neighborhood Shopping Center (Less than 15 acres, less than 125,000 sq. ft., w/usually grocery & drugstore, cleaners, beauty & barber shop, & fast food services)		120/1 000 sq. ft., 1200/acre* * *	4%	(6:4)	10%	(5:5)	
Commercial Shops	[45:40:15]						
Specialty Retail/Strip Commercial		40/1 000 sq. ft., 400/acre*	3%	(6:4)	9%	(5:5)	4.3
Electronics Superstore		50/1 000 sq. ft* *			10%	(5:5)	
Factory Outlet		40/1 000 sq. ft.* *	3%	(7:3)	9%	(5:5)	
Supermarket		150/1 000 sq. ft., 2000/acre* * *	4%	(7:3)	10%	(5:5)	
Drugstore		90/1 000 sq. ft.* *	4%	(6:4)	10%	(5:5)	
Convenience Market (15-16 hours)		500/1 000 sq. ft.* *	8%	(5:5)	8%	(5:5)	
Convenience Market (24 hours)		700/1 000 sq. ft.* *	9%	(5:5)	7%	(5:5)	
Convenience Market (w/gasoline pumps)		850/1 000 sq. ft., 550/vehicle fueling space* *	6%	(5:5)	7%	(5:5)	
Discount Club		60/1 000 sq. ft., 600/acre* * *	1%	(7:3)	9%	(5:5)	
Discount Store		60/1 000 sq. ft., 600/acre* *	3%	(6:4)	8%	(5:5)	
Furniture Store		6/1 000 sq. ft., 100/acre* *	4%	(7:3)	9%	(5:5)	
Lumber Store		30/1 000 sq. ft., 150/acre* *	7%	(6:4)	9%	(5:5)	
Home Improvement Superstore		40/1 000 sq. ft.* *	5%	(6:4)	8%	(5:5)	
Hardware/Paint Store		60/1 000 sq. ft., 600/acre* *	2%	(6:4)	9%	(5:5)	
Garden Nursery		40/1 000 sq. ft., 90/acre* *	3%	(6:4)	10%	(5:5)	
Mixed Use: Commercial (w/supermarket)/Residential		{110/1 000 sq. ft., 2000/acre* (commercial only) {5/dwelling unit, 200/acre* (residential only)	3% 9%	(6:4) (3:7)	9% 13%	(5:5) (6:4)	
EDUCATION							
University (4 years)	[91:9:0]	2.4/student, 100 acre*	10%	(8:2)	9%	(3:7)	8.9
Junior College (2 years)	[92:7:1]	1.2/student, 24/1000 sq. ft., 120/acre* * *	12%	(8:2)	9%	(6:4)	9.0
High School	[75:19:6]	1.3/student, 15/1000 sq. ft., 60/acre* * *	20%	(7:3)	10%	(4:6)	4.8
Middle/Junior High	[63:25:12]	1.4/student, 12/1000 sq. ft. 50/acre* *	30%	(6:4)	9%	(4:6)	5.0
Elementary	[57:25:10]	1.6/student, 14/1000 sq. ft., 90/acre* * *	32%	(6:4)	9%	(4:6)	3.4
Day Care	[28:58:14]	5/child, 80/1000 sq. ft.* *	17%	(5:5)	18%	(5:5)	3.7
FINANCIAL[S]	[35:42:23]						3.4
Bank (Walk-In only)		150/1 000 sq. ft., 1000/acre* * *	4%	(7:3)	8%	(4:6)	
with Drive-Through		200/1 000 sq. ft., 1500/acre*	5%	(6:4)	10%	(5:5)	
Drive-Through only		250 (125 one-way)/lane*	3%	(5:5)	13%	(5:5)	
Savings & Loan		60/1 000 sq. ft., 600/acre* *	2%		9%		
Drive-Through only		100 (50 one-way)/lane* *	4%		15%		
HOSPITAL	[73:25:2]						8.3
General		20/bed, 25/1 000 sq. ft., 250/acre*	8%	(7:3)	10%	(4:6)	
Convalescent/Nursing		3/bed* *	7%	(6:4)	7%	(4:6)	
INDUSTRIAL							
Industrial/Business Park (commercial included)	[79:19:2]	16/1 000 sq. ft., 200/acre* * *	12%	(8:2)	12%	(2:8)	9.0
Industrial Park (no commercial)		8/1 000 sq. ft., 90/acre* *	11%	(9:1)	12%	(2:8)	
Industrial Plant (multiple shifts)	[92:5:3]	10/1 000 sq. ft., 120/acre*	14%	(8:2)	15%	(3:7)	11.7
Manufacturing/Assembly		4/1 000 sq. ft., 50/acre* *	19%	(9:1)	20%	(2:8)	
Warehousing		5/1 000 sq. ft., 60/acre* *	13%	(7:3)	15%	(4:6)	
Storage		2/1 000 sq. ft., 0.2/vault, 30/acre*	6%	(5:5)	9%	(5:5)	
Science Research & Development		8/1 000 sq. ft., 80/acre*	16%	(9:1)	14%	(1:9)	
Landfill & Recycling Center		6/acre	11%	(5:5)	10%	(4:6)	

(OVER)

LAND USE	TRIP CATEGORIES [PRIMARY:DIVERTED:PASS-BY][P]	ESTIMATED WEEKDAY VEHICLE TRIP GENERATION RATE (DRIVEWAY)	HIGHEST PEAK HOUR % (plus IN:OUT ratio) Between 6:00-9:30 A.M.		Between 3:00-6:30 P.M.		TRIP LENGTH (Miles)[L]
LIBRARY	[44:44:12]	50/1000 sq. ft., 400/acre* *	2%	(7:3)	10%	(5:5)	3.9
LODGING	[58:38:4]						7.6
Hotel (w/convention facilities/restaurant)		10/occupied room, 300/acre	6%	(6:4)	8%	(6:4)	
Motel		9/occupied room, 200/acre*	8%	(4:6)	9%	(6:4)	
Resort Hotel		8/occupied room, 100/acre*	5%	(6:4)	7%	(4:6)	
Business Hotel		7/occupied room* *	8%	(4:6)	9%	(6:4)	
MILITARY	[82:16:2]	2.5/military & civilian personnel*	9%	(9:1)	10%	(2:8)	11.2
OFFICE							
Standard Commercial Office (less than 100,000 sq. ft.)	[77:19:4]	20/1000 sq. ft.,[O] 300/acre*	14%	(9:1)	13%	(2:8)	8.8
Large (High-Rise) Commercial Office (more than 100,000 sq. ft., 6+ stories)	[82:15:3]	17/1000 sq. ft.,[O] 600/acre*	13%	(9:1)	14%	(2:8)	10.0
Office Park (400,000+ sq. ft.)		12/1000 sq.ft., 200/acre* *	13%	(9:1)	13%	(2:8)	
Single Tenant Office		14/1000 sq. ft., 180/acre*	15%	(9:1)	15%	(2:8)	8.8
Corporate Headquarters		7/1000 sq. ft., 110/acre*	17%	(9:1)	16%	(1:9)	
Government (Civic Center)	[50:34:16]	30/1000 sq. ft.* *	9%	(9:1)	12%	(3:7)	6.0
Post Office							
Central/Walk-In Only		90/1000 sq. ft.* *	5%		7%		
Community (not including mail drop lane)		200/1000 sq. ft., 1300/acre*	6%	(6:4)	9%	(5:5)	
Community (w/mail drop lane)		300/1000 sq. ft., 2000/acre*	7%	(5:5)	10%	(5:5)	
Mail Drop Lane only		1500 (750 one-way)/lane*	7%	(5:5)	12%	(5:5)	
Department of Motor Vehicles		180/1000 sq. ft., 900/acre* *	6%	(6:4)	10%	(4:6)	
Medical-Dental	[60:30:10]	50/1000 sq. ft., 500/acre*	6%	(8:2)	11%	(3:7)	6.4
PARKS	[66:28:6]		4%		8%		5.4
City (developed w/meeting rooms and sports facilities)		50/acre*	13%	(5:5)	9%	(5:5)	
Regional (developed)		20/acre*					
Neighborhood/County (undeveloped)		5/acre (add for specific sport uses), 6/picnic site* * *					
State (average 1000 acres)		1/acre, 10/picnic site* *					
Amusement (Theme)		80/acre, 130/acre (summer only)* *			6%	(6:4)	
San Diego Zoo		115/acre*					
Sea World		80/acre*					
RECREATION							
Beach, Ocean or Bay	[52:39:9]	600/1000 ft. shoreline, 60/acre*					6.3
Beach, Lake (fresh water)		50/1000 ft. shoreline, 5/acre*					
Bowling Center		30/1000 sq. ft., 300/acre, 30/lane * *	7%	(7:3)	11%	(4:6)	
Campground		4/campsite* *	4%		8%		
Golf Course		7/acre, 40/hole, 700/course* * *	7%	(8:2)	9%	(3:7)	
Driving Range only		70/acre, 14/tee box*	3%	(7:3)	9%	(5:5)	
Marinas		4/berth, 20/acre* * *	3%	(3:7)	7%	(6:4)	
Multi-purpose (miniature golf, video arcade, batting cage, etc.)		90/acre	2%		6%		
Racquetball/Health Club		30/1000 sq. ft., 300/acre, 40/court*	4%	(6:4)	9%	(6:4)	
Tennis Courts		16/acre, 30/court* *	5%		11%	(5:5)	
Sports Facilities							
Outdoor Stadium		50/acre, 0.2/seat*					
Indoor Arena		30/acre, 0.1/seat*					
Racetrack		40/acre, 0.6 seat*					
Theaters (multiplex w/matinee)	[66:17:17]	80/1000 sq. ft., 1.8/seat, 360/screen*	1/3%		8%	(6:4)	6.1
RESIDENTIAL	[86:11:3]						7.9
Estate, Urban or Rural (average 1-2 DU/acre)		12/dwelling unit* [R]	8%	(3:7)	10%	(7:3)	
Single Family Detached (average 3-6 DU/acre)		10/dwelling unit* [R]	8%	(3:7)	10%	(7:3)	
Condominium (or any multi-family 6-20 DU/acre)		8/dwelling unit* [R]	8%	(2:8)	10%	(7:3)	
Apartment (or any multi-family units more than 20 DU/acre)		6/dwelling unit* [R]	8%	(2:8)	9%	(7:3)	
Military Housing (off-base, multi-family)							
(less than 6 DU/acre)		8/dwelling unit	7%	(3:7)	9%	(6:4)	
(6-20 DU/acre)		6/dwelling unit	7%	(3:7)	9%	(6:4)	
Mobile Home							
Family		5/dwelling unit, 40/acre*	8%	(3:7)	11%	(6:4)	
Adults Only		3/dwelling unit, 20/acre*	9%	(3:7)	10%	(6:4)	
Retirement Community		4/dwelling unit* *	5%	(4:6)	7%	(6:4)	
Congregate Care Facility		2.5/dwelling unit* *	4%	(6:4)	8%	(5:5)	
RESTAURANT[S]	[51:37:12]						4.7
Quality		100/1000 sq. ft., 3/seat, 500/acre* * *	1%	(6:4)	8%	(7:3)	
Sit-down, high turnover		160/1000 sq. ft., 6/seat, 1000/acre* * *	8%	(5:5)	8%	(6:4)	
Fast Food (w/drive-through)		650/1000 sq. ft., 20/seat, 3000/acre* * *	7%	(5:5)	7%	(5:5)	
Fast Food (without drive-through)		700/1000 sq. ft.* *	5%	(6:4)	7%	(5:5)	
Delicatessen (7am-4pm)		150/1000 sq. ft., 11/seat*	9%	(6:4)	3%	(3:7)	
TRANSPORTATION							
Bus Depot		25/1000 sq. ft.* *					
Truck Terminal		10/1000 sq. ft., 7/bay, 80/acre* *	9%	(4:6)	8%	(5:5)	
Waterport/Marine Terminal		170/berth, 12/acre* *					
Transit Station (Light Rail w/parking)		300/acre, $2^{1/2}$/parking space (4/occupied)* *	14%	(7:3)	15%	(3:7)	
Park & Ride Lots		400/acre (600/paved acre), 5/parking space (8/occupied)* * *	14%	(7:3)	15%	(3:7)	

* Primary source: *San Diego Traffic Generators.*

* Other sources: *ITE Trip Generation Report [6th Edition]* Trip Generation Rates (other agencies and publications), various SANDAG & CALTRANS studies, reports and estimates.

[P] Trip category percentage ratios are daily from local household surveys, often cannot be applied to very specific land uses, and do not include non-resident drivers (draft SANDAG *Analysis of Trip Diversion*, revised November, 1990):
PRIMARY - one trip directly between origin and primary destination.
DIVERTED - linked trip (having one or more stops along the way to a primary destination) whose distance compared to direct distance ≥ 1 mile.
PASS-BY - undiverted or diverted < 1 mile.

[L] Trip lengths are average weighted for all trips to and from general land use site. (All trips system-wide average length = 6.9 miles)

[C] Fitted curve equation: $Ln(T) = 0.502\ Ln(x) + 6.945$

[O] Fitted curve equation: $Ln(T) = 0.756\ Ln(x) + 3.950$

T = total trips, x = 1,000 sq. ft

[R] Fitted curve equation: $t = -2.169\ Ln(d) + 12.85$ t = trips/DU, d = density (DU/acre), DU = dwelling unit

[S] Suggested PASS-BY [undiverted or diverted < 1 mile] percentages for trip rate reductions only during P.M. peak period (based on combination of local data/review and Other sources* *):

COMMERCIAL/RETAIL	
Regional Shopping Center	20%
Community " "	30%
Neighborhood " "	40%
Specialty Retail/Strip Commercial (other)	10%
Supermarket	40%
Convenience Market	50%
Discount Club/Store	30%
FINANCIAL	
Bank	25%
AUTOMOBILE	
Gasoline Station	50%
RESTAURANT	
Quality	10%
Sit-down high turnover	20%
Fast Food	40%

[T] Trip Reductions - In order to help promote regional "smart growth" policies, and acknowledge San Diego's expanding mass transit system, consider vehicle trip rate reductions (with proper documentation and necessary adjustments for peak periods). The following are some examples:

[1] A 5% daily trip reduction for land uses with transit access or near transit stations accessible within 1/4 mile.

[2] Up to 10% daily trip reduction for mixed-use developments where residential and commercial retail are combined (demonstrate mode split of walking trips to replace vehicular trips).